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(54) **IDENTIFYING, PROCESSING AND CACHING OBJECT FRAGMENTS IN A WEB ENVIRONMENT**

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(58) **Field of Search** 711/122, 118; 707/513; 709/203

(56) **References Cited**

U.S. PATENT DOCUMENTS

5,924,116	*	7/1999	Aggarwal et al.	711/122
5,946,697	*	8/1999	Shen	707/104
6,012,126	*	1/2000	Aggarwal et al.	711/133
6,026,413	*	2/2000	Challenger et al.	707/202
6,065,058	*	5/2000	Hailpern et al.	709/231

(List continued on next page.)

OTHER PUBLICATIONS

Jadau et al. "Caching of Large Database Objects in Web Servers", IEEE Jun. 1997, pp. 10–19.*
"Spyglass: Making Devices Work With The Web", Products and Services, http://www.spyglass.com/product/wp, 7 pages, printed Sep. 19, 1997.
"Spyglass Prism Allows Non–PC Devices to Display Content Up to Four Times Faster", http://www.spyglass.com/newsflash/releases/091697prismperf.html, 3 pages, printed Sep. 19, 1997.

(List continued on next page.)

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(57) **ABSTRACT**

A method, apparatus and computer program product for identifying and creating persistent object fragments from a named object. For example, a digital content description of a named digital object can be dynamically parsed, and persistent fragment identities created and maintained to facilitate caching. Named digital objects include but are not limited to: Web pages described in XML, SGML, and HTML. The object description is revised by replacing each object fragment with its newly created persistent identity. The revised object description is then sent to the requesting node. Depending upon the properties of a fragment, this can either enable the fragment or the revised object description to be cacheable at the server and/or client device. For example, the object description can include a dynamic part which would otherwise prevent the object from being cached. The dynamic part can be recognized and treated as a separate fragment from the object description. Thus the revised document becomes static and therefore cacheable. Furthermore, fragments can be nested. Other features determine which part/segment of a named object to recognize as a fragment identity, based on its properties including: size; processing cost; and static vs. dynamic. Yet other features can determine which fragments to cache and replace, for example based on the fragment size and processing cost. Still other features allow different versions to be generated for a fragment upon request. The version created can be determined by the property of the requesting devices (e.g., handheld device or Internet appliance) and the fragment description.

64 Claims, 13 Drawing Sheets